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ARMY TEST AND EVALUATION COMMAND ABERDEEN PROVING GRO--ETC F/G 14/5
US ARMY TEST AND EVALUATION COMMAND TEST OPERATIONS PROCEDURES.--ETC(U)
AUG 79

UNCLASSIFIED TOP-7-3-519

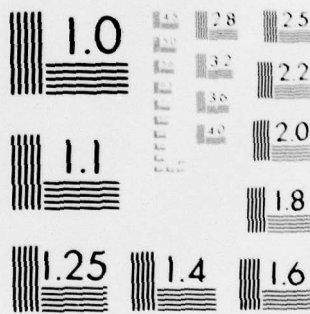
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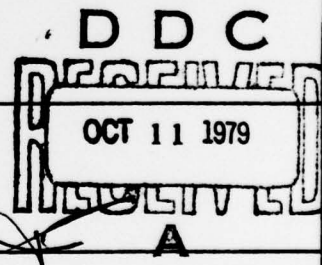
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Photography Developmental Testing
Video Camera Instrumentation
Photographic Application to Aviation
Motion Picture Camera
Still Camera

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Photographic techniques can be utilized to obtain precise data in relation to time velocity, rates and characteristics of a developmental test event or simply to document a physical defect, deficiency or shortcoming in a human factors evaluation. This document provides requirements, suggestions and techniques for incorporating photographic coverage into the developmental test of aviation materiel.

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17 August 1979

CHARACTERISTICSMINIMUM REQUIREMENTVideo image recording and
analysis

One

2.2 Support Requirements.

Camera, black and white

One

Still

As required

Motion

As required

Auxiliary photographic equipment

As required

Personnel with appropriate MOS
skill level with special training
it requires

One

Installation support

As required

Video camera and recorder, color

As required

2.3 References.

a. DOD Regulation 5200.1-R, Information Security Program, as supplemented by AR 380-5, and TECOM Supplement 1 to AR 380-5.

b. AR 108-2, Army Training and Audiovisual Support.

c. AMC Regulation 385-12, w/TECOM Supplement 1, Life Cycle Verification of Materiel Safety.

d. TECOM Regulation 108-2, Administrative and Technical Procedures.

e. USAAVNDTA Memo 108-1, Audiovisual Services/Photographic Coverage.

f. TM 11-401, Army Pictorial Techniques, Equipment and Systems.

17 August 1979

TOP 7-3-519

g. Materiel Needs documents (LR, LOA, ROC).

3. PREPARATION FOR TEST. This section provides guidance and information for planning photographic and video image coverage into the materiel development test. Photographic coverage will aid in determining whether or not the materiel under test meets the technical characteristics and performance requirements as stated in the Materiel Needs documents. Also, photographic records provide the observer with visual evidence of conditions or events which were present when the record was made. Photographic coverage requirements should be incorporated into the detailed test plan giving visibility as to type/application and camera location, as applicable. Facility, major equipment, and support requirements including specialized training should be identified in the detailed test plan. The following test planning steps should be followed to insure that cost effective photographic coverage is an integral part of each materiel development test.

3.1 Review. Review all pertinent data relative to the materiel development test.

a. Army publications pertaining to the requirements governing the use of photographic coverage. See references, paragraphs 2.3 (a - g).

b. Test Directive/Test Design Plan for test guidance or direction in the use of photography.

c. Pertinent reports on previous tests of like equipment for photographic coverage and techniques.

3.2 Photographic and Video Image Support. Develop photographic and video image/analysis support plan. This plan will cover photographic requirements, techniques, and procedures. To this end, the following information with regard to projected use of photography in a subtest should be included in the detailed test plan.

a. Subtest in which photography is to be used.

b. What is to be photographed and photographic technique.

c. Reason for photography.

17 August 1979

- d. Type and quantity of each photograph.
- e. Location and mounting technique of camera as applicable.

3.3 Schedule. Assess the availability and schedule, as required, photographic facilities and support requirements presented in paragraph 2.2, Support Requirements, this TOP.

3.4 Assess Test Safety. Assess any potential safety hazard for the test personnel and equipment. Take appropriate steps to insure that safety measures are observed throughout the test. Acquire any test safety releases required in accordance with AMC Regulation 385-12, w/TECOM Supplement 1, Life Cycle Verification of Materiel Safety.¹

3.5 Maintain Security. Insure that the photography program does not compromise the security of the United States Government or the proprietary rights of the test materiel developer. The following steps must be taken:

- a. Consult the primary test agency security representative for security guidance. Coordinate with security personnel of other test support agencies and industry, as appropriate.
- b. Take appropriate security measures (shields, restricted field of view, etc.) throughout the test to safeguard intra-industry proprietary and classified materiel and to safeguard the security of government property.
- c. See DOD Regulation 5200.1-R, Information Security Program, as supplemented by AR 380-5, and TECOM Supplement 1 to AR 380-5.²
- d. Consult the TECOM security classification guide for the project, as appropriate.
- e. Check the security planning worksheet for photographic considerations.

1. AMC Regulation 385-12, w/TECOM Supplement 1, Life Cycle Verification of Materiel Safety.

2. DOD Regulation 5200.1-R, Information Security Program, as supplemented by AR 380-5, and TECOM Supplement 1 to AR 380-5.

17 August 1979

TOP 7-3-519

3.6 Photographic Planning Considerations.

3.6.1 Photographic Options. The various options of photography can be used singularly or in combination to allow a multiplicity of effects and results. The selection of options will be determined by the results desired in the photographic record. Starting with the basic option between still (including slides) and motion pictures, the following should be considered:

- a. The dimensions of color and sound may be added through the use of cinematography and sound recording.
- b. Special techniques such as multiple exposure, time lapse, and high speed photography allow such effects as superimposition of changing images and still recording of short duration events.
- c. Special applications such as oscilloscope photography allow the filming of extremely short duration electrical phenomena.

3.6.2 Photographic Coverage. The test materiel, its characteristics, and the projected testing procedures should be examined thoroughly to determine where the insertion of photographic coverage will best complement and enhance the overall testing program. Some examples of specific procedures and their intended purposes are:

- a. Pretest still photos of test materiel -- allows comparison with pretest conditions and aids in planning for subsequent test procedures.
- b. Photographs of materiel shortcomings or deficiencies -- document the findings.
- c. Motion picture of test materiel in dynamic performance -- enables continuous monitoring of equipment performance during periods when predicted high stresses increase the probability of failure, and allows a visual record at or near the time of an occurrence enabling later analysis for determination of causes.
- d. Video image recording -- an optical electronic method of recording color or black and white image on magnetic tape instead of photographic film.

17 August 1979

The above list represents only a few of the possible applications of photographic coverage. The possible gains to be realized by effective use of these techniques remain virtually unlimited. However, improper or insufficient photographic or video image recording coverage can mean the irrecoverable loss of test data.

3.6.3 Photography Application. Following is a partial list of camera types and formats that have been successfully used to record test item functions in a variety of situations and in diverse environments. Safety procedures must be closely followed when camera installation modifies or changes test platform characteristics.

3.6.3.1 Camera Types, Format, Frame Rate, Film Capacity, Power Requirements, Timing Mode.

a. Still Camera Manual

Speed Graphic	4x5 inch
Graphlex XL	2 ½ x 3 ½ inch
Nikon F	35mm

b. Still Camera Motorized

Nikon F25A	
Automax Series	35mm
Hulcher	35mm/70mm

c. Motion picture cameras, noninstrumentation -- Sixteen millimeter (mm) black and white or color with 0 to 50 pictures per second (PPS) capability. Lenses range from 8mm wide angle to 300mm telescopic and zoom capability. The film load is 400 feet and the camera has a self-contained power supply.

d. Motion picture cameras, instrumentation -- Instrumentation cameras used have 16 to 400 PPS capability with 9mm to 150mm lenses. Black and white or color 16mm film can be used on the 400-foot rolls. The equipment operates on 28 volt DC and has double pin registration.

17 August 1979

TOP 7-3-519

e. Fairchild analyzer -- This equipment records a series of narrow pictures on a photographic plate from which it is possible to determine distance, angles, and elapsed time. It is specifically used to record takeoff and landing data.

f. Video camera equipment portable, battery operated 12VDC, single or multiple tube 1" or 2" format, color or black and white. Video image cameras and compatible video recorders either $\frac{1}{2}$ " or $\frac{3}{4}$ " tape format, open reel or cassette may be used in place of conventional motion picture photography, particularly where speed of access to the finished product is required. Video recording equipment such as the SLO 320/340 or similar equipment can record up to 1-hour duration and can be used with any standard "C" mount lenses.

3.6.3.2 Previously Used Technique/Application. Specific applications that have been used on aircraft for documentation and analysis of operation and failures of weapons, engines, instruments, and targets are:

a. UH-1 and OH-6 skid mounts. Mounts were locally fabricated to position motion picture cameras on the landing gear skids for evaluation of weapon performance.

b. UH-1 and CH-47 instrumentation evaluation. High speed cameras were mounted in a box containing duplicate engine instruments. At stated intervals crewmembers activated the cameras to record engine temperatures and pressures.

c. OH-58 engine inlet icing. Areas of the cowling forward of the engine were cut away and replaced with plexiglass windows. Lights and high speed cameras were mounted, and successful documentation of ice formation and ingestion by the engine was obtained.

d. Motion picture cameras were mounted at various times on the landing gear skids, on the tail skid, on the main transmission pylon, and in the weapon turret of the AH-1G. The overall results were early identification of failure and malfunction causes in weapons systems. A feed problem in one armament system was recognized only because of the camera mounted on the tail skid. Once identified, the elusive cause of this malfunction was corrected.

17 August 1979

4. TEST CONTROLS. Photographic coverage of a test project will be conducted with the observance of all safety and security regulations and in compliance with this TOP. The following guidelines will be observed:

- a. Scales, color standards, etc., will be used in the photographs to convey size, shape, and color information.
- b. Photographs will be developed and processed in a timely fashion.
- c. Standard photographic procedures will be used when possible. Deviations will be explained in the test report.
- d. Only properly trained and qualified personnel will participate in the photographic coverage of the test.
- e. Photographic techniques will be documented such that photographic test results can be duplicated or compared.
- f. Captions will accompany photographs and other recorded material to provide the who, what, when, why, where and how and highly specific information, e. g., frame rate, focal length, timing used, when photographic/TV product is used for instrumentation, data collection where precision of information is crucial.

5. TEST PERFORMANCE. The responsible test project person must coordinate his photographic program plans with the photo/optics and instrumentation personnel, as applicable. The test officer should outline specific requirements and solicit their advice and recommendations as to specific items of equipment and techniques to be used in obtaining results. These data and other pertinent information must be determined for inclusion of the photo/optics package into the instrumentation program.

5.1 Send a Disposition Form to the Photo and Optics Branch providing the following information:

- a. Type and number of photographs required.
- b. Photographic procedure/technique including camera location, film speed, etc.
- c. Estimated number of test runs to be photographed.

17 August 1979

TOP 7-3-519

- d. Test duration -- "begin" and "end" time.
- e. Test flights per day requiring photographic support.
- f. Schedule availability of aircraft for photographic equipment installation.

5.2 Request the photo/optics organization to:

- a. Provide a comprehensive cost estimate for their services including removal and disassembly of the photographic package, if required.
- b. Locate and procure any photographic component as required.
- c. Maintain the photographic package throughout the test.
- d. Provide technical advice to project persons as related to photographic support.
- e. Perform all special photographic procedures required to support the test.

5.3 Test Conduct.

5.3.1 Initial Inspection/Physical Characteristics.

a. Photograph the test materiel from various angles to establish its initial condition and to display its physical characteristics. Consider and perform the following (if applicable):

(1) Where materiel is composed of subsystems or components, photograph each component separately and all components in a group layout and assembled.

(2) Photograph significant features.

5.3.2 Technical Characteristics. Photograph laboratory or bench tests in progress to determine the technical characteristics showing the complete setup, equipment used, and displays, as appropriate.

17 August 1979

5.3.3 Installation.

- a. Photographically record the installation of the test materiel.
- b. Obtain photographs of the final installation, including the installed positions of each component of the system where the components are installed at different locations; e. g., antennas, remote sensors, or power units.

5.3.4 Operation and Performance.

- a. Photograph the test materiel performing its primary function, including when it is in motion and otherwise being utilized by personnel.
- b. Utilize vantage points from which the photographic record will offer the greatest evaluation of the test materiel's performance including interior and exterior records during flight procedures.

5.3.5 Maintenance.

- a. Photograph the materiel under test to illustrate maintenance procedures.
- b. Photograph defective or damaged materials and components.

5.3.6 Safety. Photograph all characteristics of the test materiel defined as a real or potential hazard.

5.3.7 Compatibility. Document signs of incompatibility by using motion pictures and/or sound recording to record interference on visual displays and sound systems.

5.3.8 Human Factors. Illustrate defects in human factors characteristics using still or motion pictures, as applicable, showing the test materiel being used by personnel at times when effective utilization is impaired by poor human factors characteristics.

5.3.9 Value Engineering. Illustrate areas of the test item where Value Engineering improvements can be implemented.

17 August 1979

TOP 7-3-519

5.4 Photographic Test Data Required. Test data for photographic coverage of development test shall consist of:

- a. Proper and complete documentation of all photographic materiel.
- b. Caption sheets for both still and motion photography, answering questions concerning who, what, when, where, why, and how. Complete data for the following:
 - (1) Still photography, DA Form 3315 (Appendix B-1).
 - (2) Motion photography, DA Form 3317 (Appendix B-2).
- c. Other appropriate data requirements presented in paragraphs 2.3 (a - e), this TOP.

6. DATA REDUCTION AND PRESENTATION. Utilize photographic/video image records obtained during testing to furnish precise data reduction analysis/objective human factors evaluation. Measurements from photographic/video image instrumentation can provide time, velocity, spin rates, penetration explosive characteristics, etc., for integration into test reports. Include or make reference to photographic records in the report to illustrate a narrative discussion, or to present supporting evidence of malfunctions, shortcomings, deficiencies, physical defects, etc.

Recommended changes to this publication should be forwarded to Commander, US Army Test and Evaluation Command, ATTN: DRSTE-AD-M, Aberdeen Proving Ground, MD 21005. Technical information may be obtained from the preparing activity: Commander, US Army Aviation Development Test Activity, ATTN: STEBG-QA, Fort Rucker, AL 36362. Additional copies are available from the Defense Documentation Center, Cameron Station, Alexandria, VA 22314. This document is identified by the accession number (AD No) printed on the first page.

17 August 1979

APPENDIX A-1

PRETEST CHECKLIST

Photographic Coverage

1. Have photographic equipment, facilities, and support requirements been scheduled or secured? Yes ____ No _____. See paragraphs 2 - 2.3, this TOP.
2. Have appropriate test planning steps been accomplished in accordance with paragraphs 3 - 3.5, this TOP? Yes ____ No _____.
3. Have test control measures been implemented such that photographic results can be duplicated or compared? Yes ____ No _____. See paragraphs 4 (a - f), this TOP.
4. Has appropriate written and verbal correspondence been effected? Yes ____ No _____. See paragraphs 5, 5.1 and 5.2, this TOP.

17 August 1979

17 August 1979

APPENDIX A-2

POST-TEST CHECKLIST

Photographic Coverage

1. Have all photographs been documented with appropriate captions such that duplicated results or comparisons could be made? Yes ____ No ____.
2. Were photographic facilities, equipment, and support accommodations adequate to accomplish the photographic test objectives? Yes ____ No ____.
3. Were test results compromised in any way due to insufficient photographic coverage or photographic test planning? Yes ____ No ____.
4. Were the test results compromised in any way due to photographic test control procedures? Yes ____ No ____.

MOTION PICTURE CAPTION (AR 108-5)					SECURITY CLASSIFICATION OF FILM	
PARENT PHOTO UNIT			DETACHMENT			
DELIVER TO: (Include ZIP Code)			UNIT WORK ORDER NO.		PROJECT NO.	
			SHIPPING DESIGNATOR AND NO.			
SUBJECT			LOCATION			
CAMERAMAN			SOUNDMAN			DATE SHOT
CAMERA	EMULSION NO.	FOOTAGE EXPOSED	NUMBER OF PRIOR SHIPMENTS THIS SUBJECT		MORE TO FOLLOW <input type="checkbox"/> YES <input type="checkbox"/> NO	
SOUND SYSTEM	LIGHT CONDITIONS	FILM SPEED & DATE	NUMBER OF CANS	HOW SHIPPED	DATE SHIPPED	
CHECK APPLICABLE BOX: <input type="checkbox"/> 35 MM <input type="checkbox"/> 16 MM <input type="checkbox"/> BLACK AND WHITE <input type="checkbox"/> COLOR						
ROLL NO.	FOOT-AGE COUNT	SCENE NO.	DESCRIPTION OF SCENES (Give background of story, caption card number, and tabulation of scene lists)			

B-2

DA FORM 3317
1 MAR 55

REPLACES DA FORM 11-198, 1 OCT 55, WHICH IS OBSOLETE.

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